Vertex Location

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Outline

- Procedure – remind everyone what I am doing
- Problems – discuss where I am having difficulties
- New events – give information about this data set
- Events – show pictures and discuss some specific events
- Conclusion

Procedure

- Find good spectrometer track
  - Match a track in the U and views and verify it using the x-view
  - By good, I mean either stiff tracks, such as muons or tracks with many hits, especially hits in the drift chamber
  - For showers make a spectrometer track that goes through center of shower

Procedure

- Run locate code using the spectrometer track(s)
  - Locate finds emulsion tracks that match the spectrometer track within some cuts on angle and position
  - Makes a list of these match tracks
  - For each match track locate loops over all other emulsion tracks to try to form vertices
  - Locate outputs a list of vertices and a daft file which contains information on these vertex candidates

Procedure

- View candidates in ROOT
  - In ROOT, the vertex candidate can be rotated to check if the vertex stays a vertex at all positions
  - Check emulsion for upstream tracks
  - Check emulsion for downstream tracks
  - Find best vertex candidate
- Project emulsion data onto spectrometer data
  - Look for many spectrometer hits on emulsion tracks
  - If it looks good, send to Japan

Problems

- Not finding as many events as I would like
- Attempted all new events and all not yet found events
  - Not yet found events have already been looked at 2 or 3 times
  - New events should be easy to find
  - Due to multiple mfiles, I ran the code of 57 different new event mfiles and 179 different not yet found mfiles

New events

- Out of 83 new events
  - 18 were found (5 by me)
  - 28 do not have mfiles
  - 6 could not find a good spectrometer track
  - 1 has no .rft file
  - 1 is out of the emulsion
  - 29 I have attempted to find unsuccessfully

Found events

- Relocated the vertex for all of the found events
  - Located 10 on first pass (tight cuts)
  - Located 3 on second pass (loose cuts)
  - Located 4 using other methods
  - Could not locate 1 event

Comparison

- 14% had no vertex candidates
- 41% are electron events
- 14% are muon events
- 45% are unrecognizable
- 20% were predicted out of scan volume

- 22% had no vertex candidates
- 38% are electron events
- 22% are muon events
- 40% are unrecognizable
- 35% were predicted outside of scan volume

Comparison

- 68% has 1 spectrometer track
- 20% had 2 spec tracks
- 11% had 3 spec tracks
- 48% are sparse events
- 52% are messy events

- 33% had 1 spectrometer track
- 60% had 2 spec tracks
- 6% had 3 spec tracks
- 38% are sparse events
- 63% are messy events

Specific Events

- 2811_20190
  - Discussed this event in phone meeting
  - Simple event that should be located
- 2897_21536
  - Simple event that I have located
- 2875_04983
  - Messy event that has not been located, more typical
- 3024_03606
  - Messy event that I have located with two-track vertex

Conclusion

- Only noticeable difference was in the number spectrometer tracks each event had
- Otherwise no appreciable differences
- Should be able to locate these events with the techniques I have been using, but I have not been able to locate the events
- Reason: quality of spectrometer tracks

Future Analysis

- Have new methods to try which will minimize importance of spectrometer tracks
  - Version of code that uses all U and V spectrometer tracks instead of 3-D tracks
    - Used this method to find last 3 found events
  - Version of code that uses no spec tracks, instead looks for vertices in emulsion using no match tracks